

TWO NEW SPECIES OF TUBIFICIDAE (OLIGOCHAETA) FROM THE NORTHERN TERRITORY OF AUSTRALIA

Ralph O. Brinkhurst

Abstract.—*Antipodrilus magelensis*, new species, differs from the two other *Antipodrilus* species with bifid setae in that the penes have thickened internal basement membranes which look like penis sheaths in whole mounted specimens. *Rhyacodrilus billabongus*, new species, has bifid setae and muscular atria without prostates, as does *R. fultoni*, but the penial setae and atria differ from those of the latter. This species is discussed in relation to two recently described monotypic marine littoral genera (*Vadicola*, *Ainudrilus*) which have no external prostates on the atria.

Magela Creek, Northern Territory, Australia, is a branch of the East Alligator River about 250 km east of Darwin. A series of studies of this system has been made prior to the start of uranium mining in the Ranger deposit, which lies within the watershed. The macroinvertebrate fauna was described by Marchant (1982) but the Oligochaeta have been unidentified until now. Material sent to me by P. M. Outridge from this system consisted of specimens collected in four billabongs (Nankeen, Mudginberri, Georgetown, and Bowerbird) at various dates in 1981-1982. The locations of the billabongs are indicated in Marchant (1982) and are shown on Australian Topographic 1:100,000 series maps 5473 (East Alligator), 5572 (Howship) and 5472 (Cahill). Three genera of the family Naididae and two genera of the family Tubificidae were identified, the tubificid genera being represented by two species new to science.

Methods and Materials

All of the material was preserved in alcohol. Specimens were either mounted unstained in polyvinyl lactophenol (Gurr) or were stained in borax carmine, dehydrated, and mounted in Canada balsam whole or after dissection in the final mounting medium.

Antipodrilus magelensis, new species

Figs. 1, 2

Holotype.—USNM 80692, a slide-mounted, dissected specimen.

Type-locality.—Mudginberri Billabong, Magela Creek, Northern Territory, Australia, mixed sand and silt, 4 May 1981.

Paratypes.—USNM 80693-97, 80700, 2 dissected specimens on 2 slides, 6 whole mounted specimens on 3 slides, 19 specimens in fluid. Brinkhurst collection, 15 mature and 39 immature specimens, whole mounted or dissected, on 28 slides. Paratypes from Mudginberri, Georgetown and Bowerbird billabongs, only immature specimens from Nankeen Billabong.

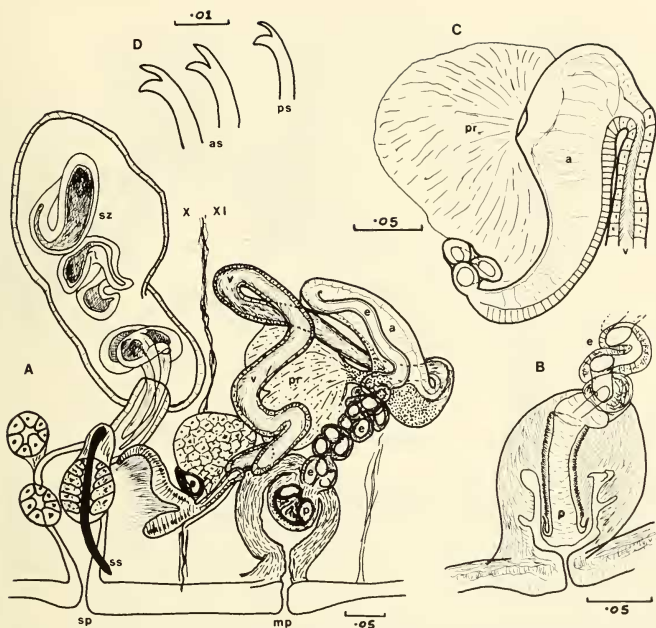


Fig. 1. *Antipodrilus magelensis*, reproductive system and setae: A, Lateral view of dissected holotype, segments X/XI, anterior to left; B, Detail of penis; C, Detail of atrium, vas deferens and prostate gland unions; D, Anterior and posterior somatic setae. a—atrium, as—anterior seta, e—ejaculatory duct, mp—male pore, p—penis, pr—prostate gland, ps—posterior seta, sp—spermathecal pore, ss—spermathecal seta, sz—spermatozeugmata, v—vas deferens. Scales in mm.

Etymology.—Worm from Magela Creek.

Description.—Length 0.9 mm, breadth at widest 0.3 mm, 40 segments in single intact specimen. Setae of preclitellar segments 4–6 per bundle with setal teeth equal in length and breadth. Setae diminish in number in postclitellar segments to 2 per bundle, the upper teeth becoming shorter and thinner than the lower. The ventral setae of X are replaced by modified spermathecal setae in glandular sacs in mature specimens (Figs. 1, 2); the sacs appear to bear 2 small glandular bodies. The spermathecal setae and pores may lie close together near the midline of X or may lie in the normal setal line. The spermathecae have distinct ducts and elongate, voluminous ampullae filled with elongate spermatozeugmata in mated specimens. The vasa deferentia are about 3 times the length of the atria; they open into the atria subapically and on the opposite side to the prostate glands. The short atria terminate in strongly coiled ejaculatory ducts that must be longer

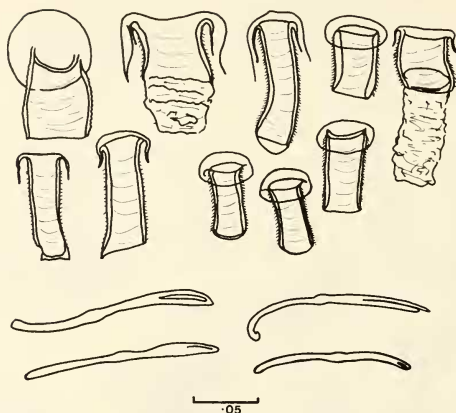


Fig. 2. *A. magelensis*, apparent penis sheaths (above) and spermathecal setae (below). Scale in mm.

than the atria, though their length is impossible to determine due to the strong coiling. The penes are large and muscular, and are set in muscular sacs. The basement membranes of the penial muscle cells form thick clear layers within the penes that resemble cuticular penis sheaths in whole-mounted specimens mounted in polyvinyl lactophenol. These false penis-sheaths vary in length and width, presumably depending on the state of contraction of the penes (Fig. 2).

Remarks.—Indistinct versions of the false penis sheaths can be seen in one other *Antipodrilus* species (*A. timmsi*, see Brinkhurst 1971:fig. 2C, pe) but have not been observed in the others. *Antipodrilus timmsi* Brinkhurst has hair and pectinate setae in dorsal bundles, and while this alone would not exclude the possibility of identifying the new material as part of that species, other factors such as the long vas deferens, uncoiled ejaculatory duct and short spermatozeugmata of *A. timmsi* indicate a clear separation of the two. In *A. plectilus* Brinkhurst and Fulton there are more anterior setae than in *A. magelensis*, and the setae also have shorter upper teeth; the ejaculatory ducts are short and uncoiled in *A. plectilus*. As the name suggests, there are even more setae in *A. multiseta* Brinkhurst and Fulton, and the ejaculatory ducts, while quite elongate, were not seen to be coiled (Brinkhurst and Fulton 1979). *Antipodrilus davidis* (Benham) has hair and pectinate setae and short, uncoiled, ejaculatory ducts.

Habitat.—Wide range of substrates from fine mud with high organic content to gravel, in billabongs (pools in or near a dry creek bed).

Distribution.—Known only from Magela Creek to date.

Rhyacodrilus billabongus, new species

Fig. 3

Holotype.—USNM 80698, a dissected specimen.

Type-locality.—Bowerbird Billabong, Magela Creek, Northern Territory, Aus-

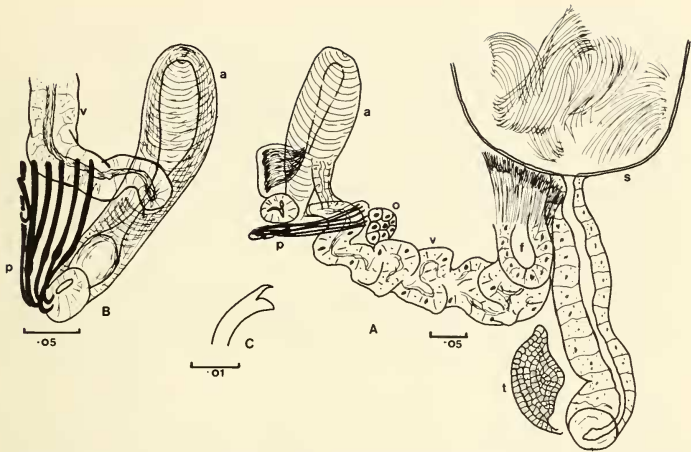


Fig. 3. *Rhyacodrilus billabongus*, reproductive system and setae: A, Lateral view of dissected holotype, segment X/XI, anterior to right; B, Detail of vas deferens, atrium and penial setae; C, Anterior somatic seta. a—atrium, f—male funnel, o—ovary, p—penial setae, s—spermatheca, t—testis, v—vas deferens. Scales in mm.

tralia, a long, narrow, deep lagoon which feeds a perennially-flowing creek; in the dry season a fast-flowing riffle some 10 cm deep, heavily covered with macrophytes, over a substrate of sand, gravel, and rock; in the wet season a torrent up to 20 m deep (type date: 21 Aug 1981).

Paratypes.—USNM 80699, a whole mounted specimen; Brinkhurst collection, a dissected specimen, both from the type-locality.

Etymology.—Worm from a billabong.

Description.—No dimensions available as worms fragmented; anterior end of undissected specimen c. 0.5 mm wide after flattening. Setae of preclitellar segments 4–6 per bundle, with teeth equally long but the upper teeth thinner than the lower, and sometimes slightly bent distally (Fig. 3), number of setae reduced to 3 in immediate postclitellar segments, no posterior end available for inspection. Ventral setae of XI are modified as penial setae, 6 in each bundle, strongly recurved distally with a distal nodulus (Fig. 3p). Spermathecal pores lie anteriorly on X, in the ventral setal line; spermathecal ducts are long and narrow, sharply set-off from the globular ampullae (Fig. 3). Sperm is in loose masses in the spermathecae. The vasa deferentia are wide and glandular, and appear to be about twice the length of the muscular, upright atria. There are no external prostate cells on the atria. While the male terminalia cannot be clearly seen, there are no signs of penes; the superficial male pores are small circular openings on the body-wall (Fig. 3). The vasa deferentia enter the atria just above their bases. There appears to be a bundle of sperm associated with the base of one atrium in the holotype (Fig. 3),

but as this was seen on a dissected specimen it may be displaced from a spermatheca. Coelomocytes are large and abundant.

Remarks.—Most *Rhyacodrilus* species have prostate glands on the atria. *Rhyacodrilus* (*Taupodrilus*) *simplex* (Benham) does not, and may revert to its status as the type-species of the genus *Taupodrilus* once the much needed revision of these genera is undertaken. *Rhyacodrilus fultoni* Brinkhurst lacks the dorsal hair and pectinate setae of *R. simplex*, and also lacks prostate glands. However, it has 10–13 setae per bundle anteriorly instead of the small number in the new material, and the penial setae are both more numerous and straighter than in *R. billabongus*. The atria in *R. fultoni* are almost spherical and open into a second pair of spherical chambers; the vasa deferentia do not appear to be wide and glandular as they are in the new material (Brinkhurst 1982).

While the distinction between *R. billabongus* and other *Rhyacodrilus* species is clear, there is a residual taxonomic problem at the generic level. There are two monotypic marine littoral rhyacodriline genera that should be mentioned here. The genus *Vadicola* was erected by Baker (1982) for a species with bifid somatic setae, glandular vasa deferentia and atria without prostate glands. The vasa deferentia join the atria just below their ental ends, or apically if the short atria are considered to be bent over entally. The atria terminate in muscular ducts termed ejaculatory ducts by Baker, and these are separated from the atria by inwardly directed internal projections that may suggest a total eversion of the lower parts of the system during copulation. In *Ainudrilus* the setae are also limited to simple bifids in the somatic bundles, but Finogenova (1982) interprets the male ducts differently from Baker (1982). In *Ainudrilus* there is a ciliated tubular part of the male duct running from the funnel to an upright muscular structure, and these appear to be quite similar to the structures described in *Vadicola*. However, where Baker referred to glandular vasa deferentia and naked atria, Finogenova sees the ciliated glandular duct-like section as atrial and the upright muscular structure as constituting a penis sac. *Vadicola* is known from intertidal habitats along the whole Pacific coast of British Columbia, including the Queen Charlotte Islands, and *Ainudrilus* is also intertidal, from the Pacific coast of the Soviet Union (Urup Islands). The basis of the interpretation by Finogenova must be that prostate cells arise by the penetration of the muscular walls of the atria by developing prostatic cells derived from the atrial linings, whereas the vasa deferentia grow back towards the atria from the male funnels during ontogeny. However, many species of the family Naididae have prostate cells on the vasa deferentia, and Baker (1982) suggests that the vasa deferentia of *Vadicola* have taken over the prostatic function from the atrial cells. The ciliation of the tubular and glandular ducts termed atria by Finogenova suggests that they are possibly vasa deferentia and, as Baker suggested, that glandular vas deferens cells differ from prostatic cells, the histology of the secretory cells of these two genera will have to be carefully compared.¹ Both of these genera are quite distinct from *R. billabongus* in atrial form and the position of the union of the vasa deferentia and atria, and so I prefer to leave the new material assigned to the predominantly freshwater genus *Rhyacodrilus*, perhaps to be ultimately allocated to *Taupodrilus*.

¹ Note added in proof: C. Erseus (pers. comm.) has been able to compare material of both *Ainudrilus* and *Vadicola* and suggests that these taxa are at least congeneric.

Other Taxa

Six other species were present in the collection. The commonest species was *Aulodrilus pigueti* Kow., with 31 specimens at Georgetown, 11 at Mudginberri but only 1 at Nankeen. *Aulodrilus pluriseta* was present at the first two of these billabongs (7 and 2 specimens respectively). No other tubificids were found. Twelve specimens of the naidid *Allonais inaequalis* (Stephenson) were found at Bowerbird Billabong, the specimens conforming to the description in Brinkhurst (1971). Three specimens of *Branchiodrilus hortensis* (Stephenson) were tentatively identified, 1 from Nankeen and 2 from Georgetown Billabong. Gills were present throughout most of the rather fragmented specimens, but the hair setae were enclosed in the gills, whereas there are supposed to be some free hair setae posteriorly in this species. A total of 3 *Dero* specimens was found, but these could not be identified to species. This species list is typical of many tropical and subtropical habitats (apart from the restriction of *Antipodrilus* to the Antipodes), but the absence of *Limnodrilus* and *Branchiura* (Tubificidae) is unusual, especially as both genera are well-represented in disturbed and marginal habitats.

Acknowledgments

I am indebted to Peter Outridge for access to the collection and for the information about the habitats involved, and to R. D. Kathman for critical review of the manuscript.

Literature Cited

- Baker, H. R. 1982. *Vadicola aprostatus* gen. nov., sp. nov., a marine oligochaete (Tubificidae; Rhyacodrilinae) from British Columbia.—Canadian Journal of Zoology 60:3232–3236.
- Brinkhurst, R. O. 1971. The aquatic Oligochaeta known from Australia, New Zealand, Tasmania, and the adjacent islands.—University of Queensland Papers 3:99–128.
- . 1982. Additional aquatic Oligochaeta from Australia and New Zealand.—Records of the Queen Victoria Museum 78:1–16.
- , and W. Fulton. 1979. Some aquatic Oligochaeta from Tasmania.—Records of the Queen Victoria Museum 64:1–8.
- Finogenova, N. P. 1982. *Ainudrilus oceanicus*, a new genus and species of the family Tubificidae (Oligochaeta).—Zoologicheskii Zhurnal 61:1255–1258.
- Marchant, R. 1982. Seasonal variation in the macroinvertebrate fauna of billabongs along Magela Creek, Northern Territory.—Australian Journal of Marine and Freshwater Research 33:329–342.

Ocean Ecology Laboratory, Institute of Ocean Sciences, P.O. Box 6000, 9860 West Saanich Road, Sidney, British Columbia, Canada V8L 4B2.